Level 1 Calorimeter Trigger Upgrade: Pre-Installation Plans

Michael J. Mulhearn
Columbia

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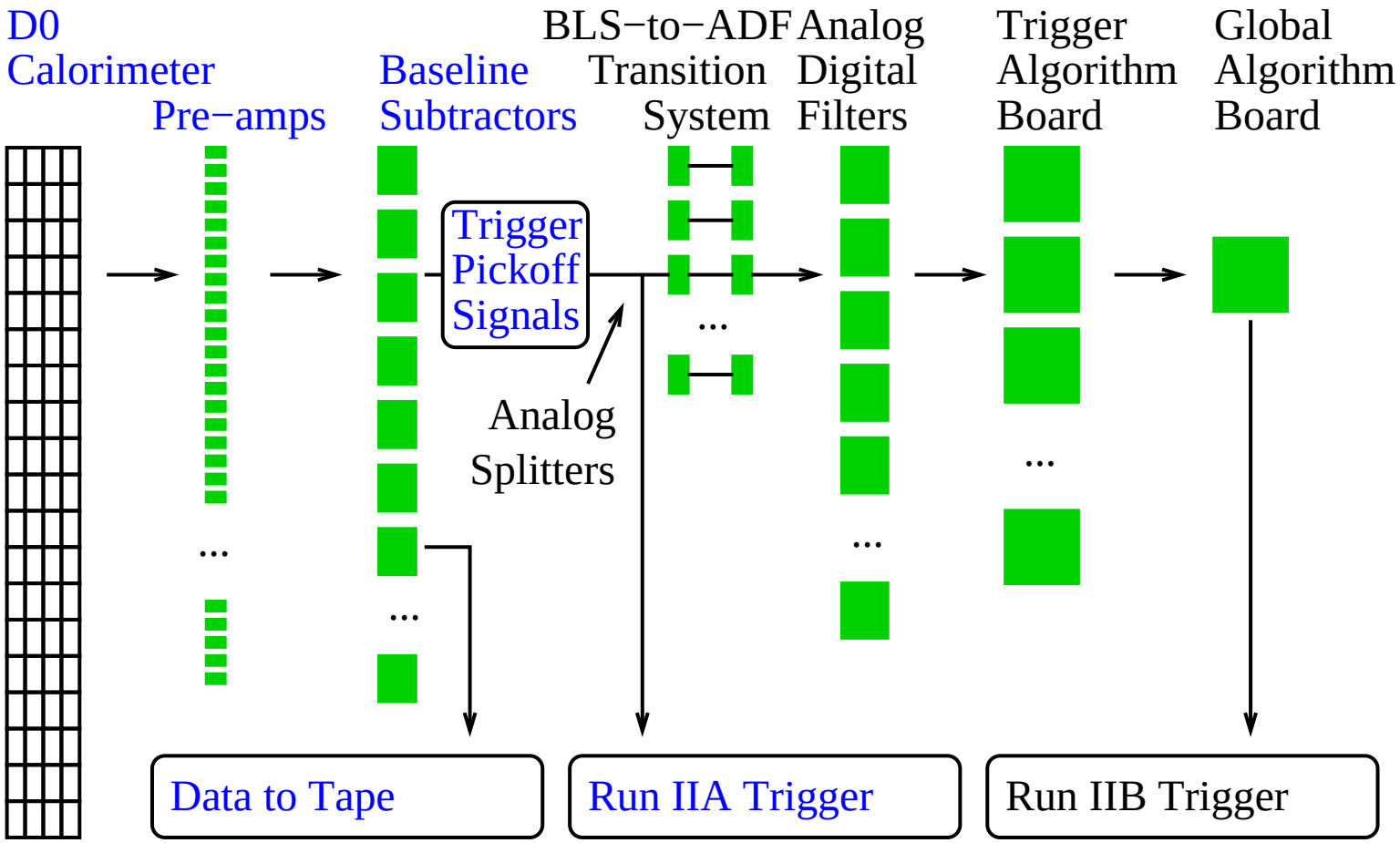
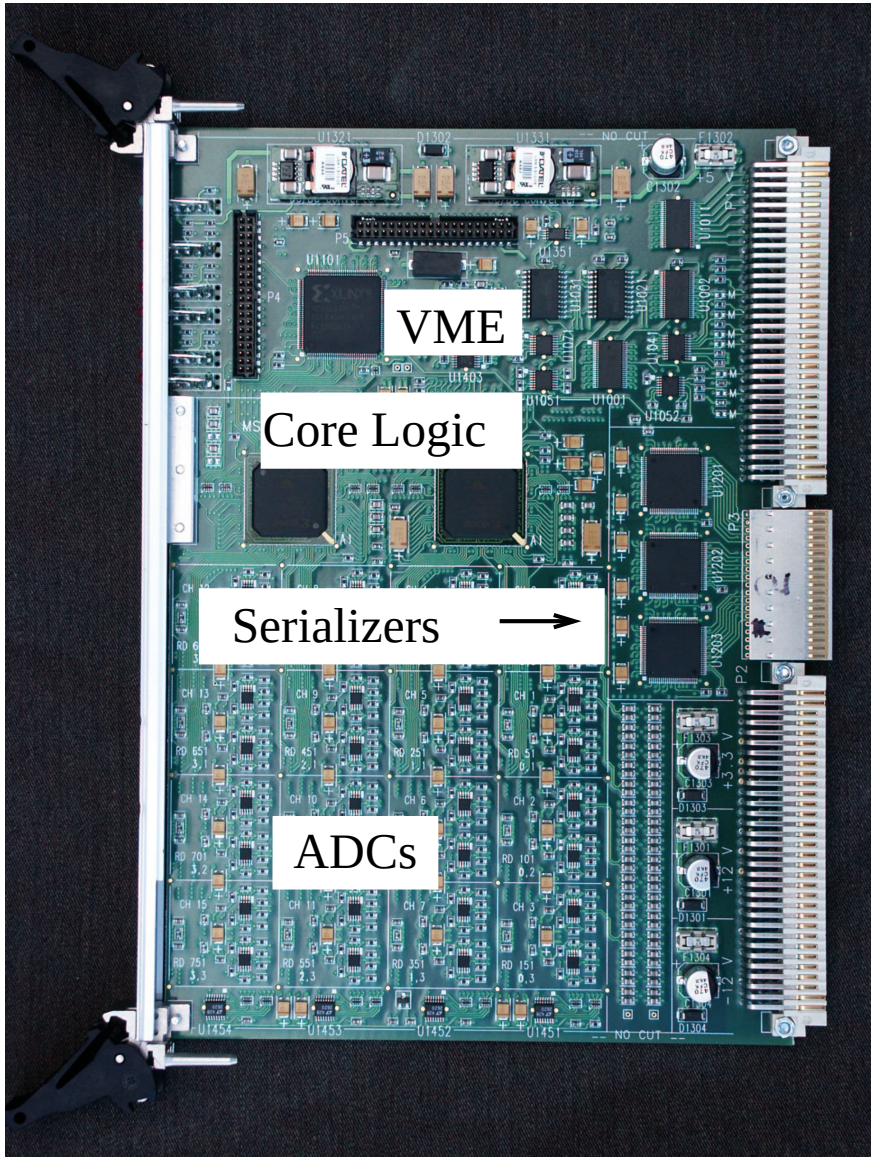
Pre-Installation Overview



Analog Digital Filter



VME
Board Control

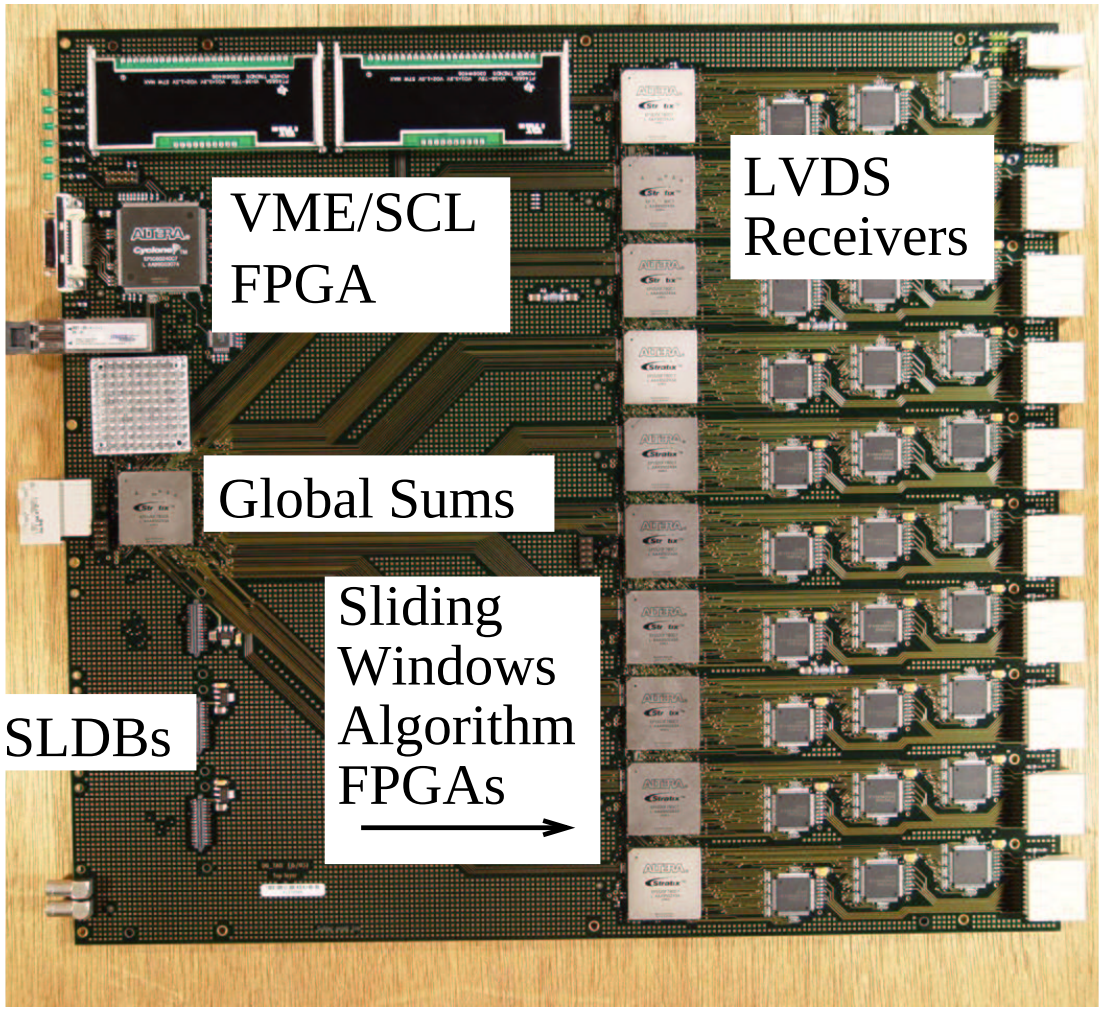
Serial
Digital Out
Trigger Towers

Trigger
Algorithm
Boards
(TAB)

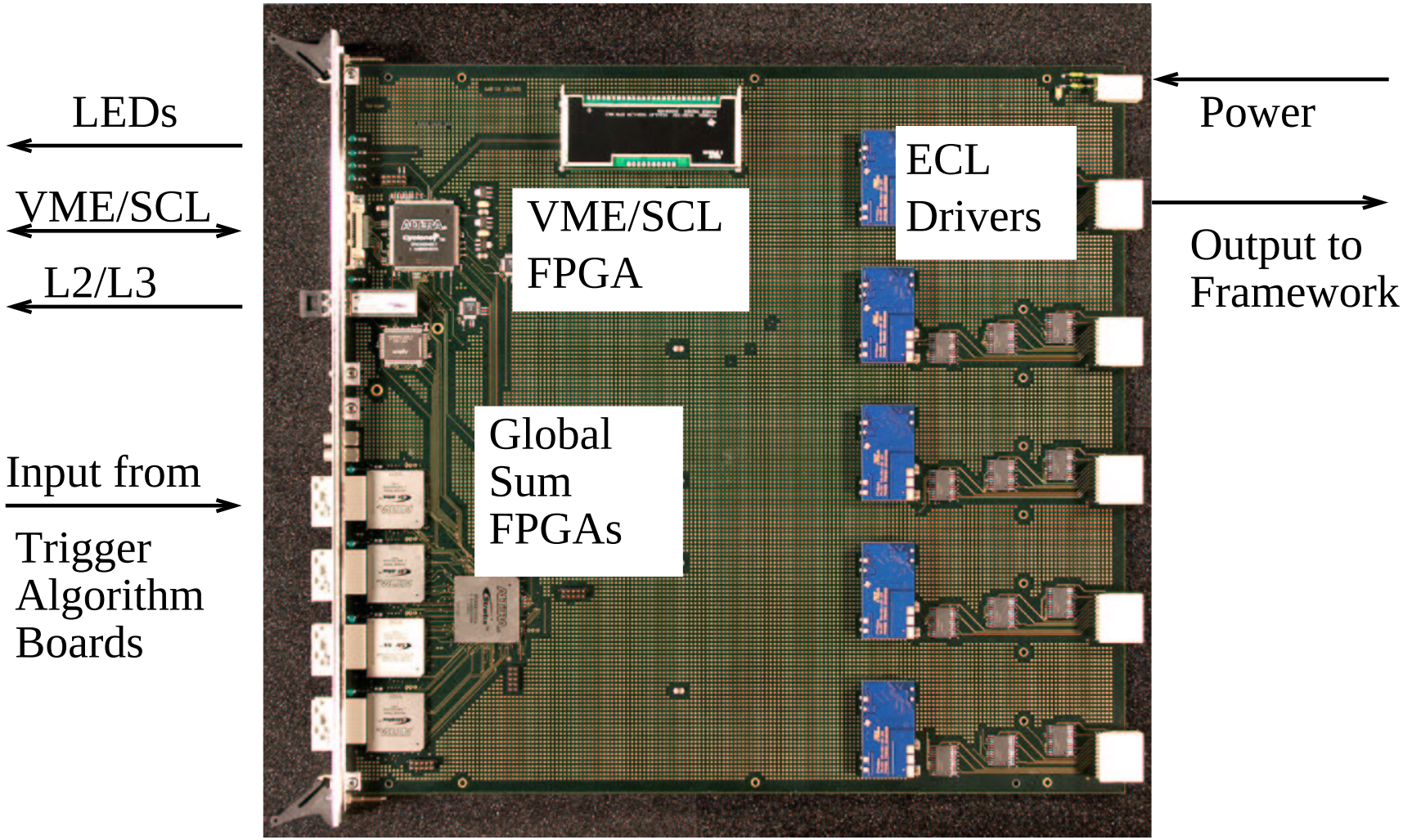
Analog In
Trigger
Pickoff
Signals

Baseline
Subtractors
(BLS)

Trigger Algorithm Board



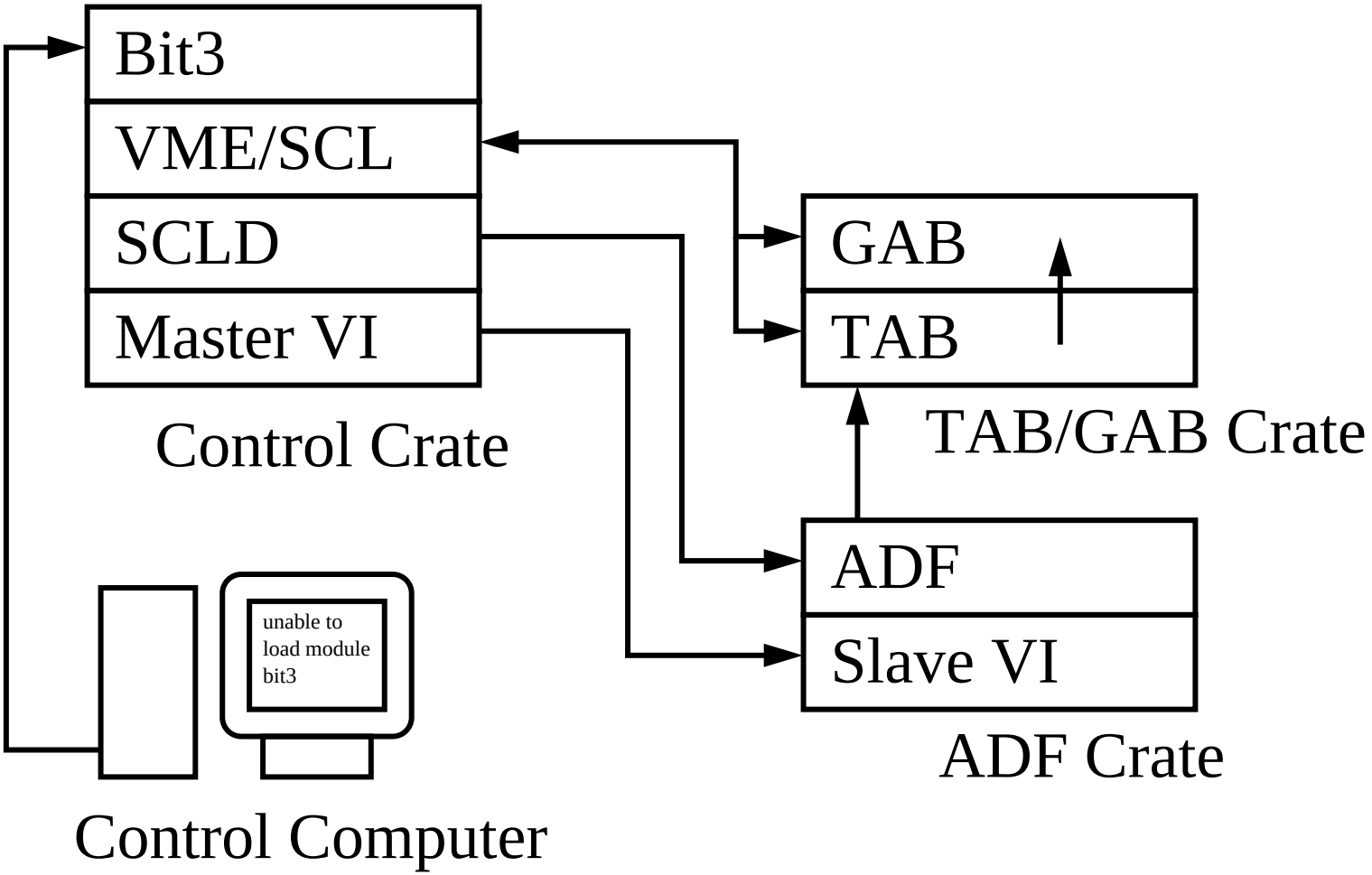
Global Algorithm Board



Completed Tests

- all firmware exists and has been tested, except:
  - digital filter algorithms (?)
  - new EM algorithm (under test)
  - and/or term creation (under test)
  - GAB→L2/L3
- extensive bench tests of all individual boards
- interface tests:
  - VME/SCL→TAB/GAB and TAB→GAB (Nevis)
  - SCLD→ADF v2 (MSU)
  - ADFv1→TAB using SCL timing (Fermilab)
  - TAB→L1Muon (Fermilab)

Period 1



Crucial Milestone: Test ADF-to-TAB interface!

What can be tested?

- fake data loaded into ADFs is received by TAB.
- full speed tests for bit error/rate
- add multiple ADF cards and channels
- add multiple TABs

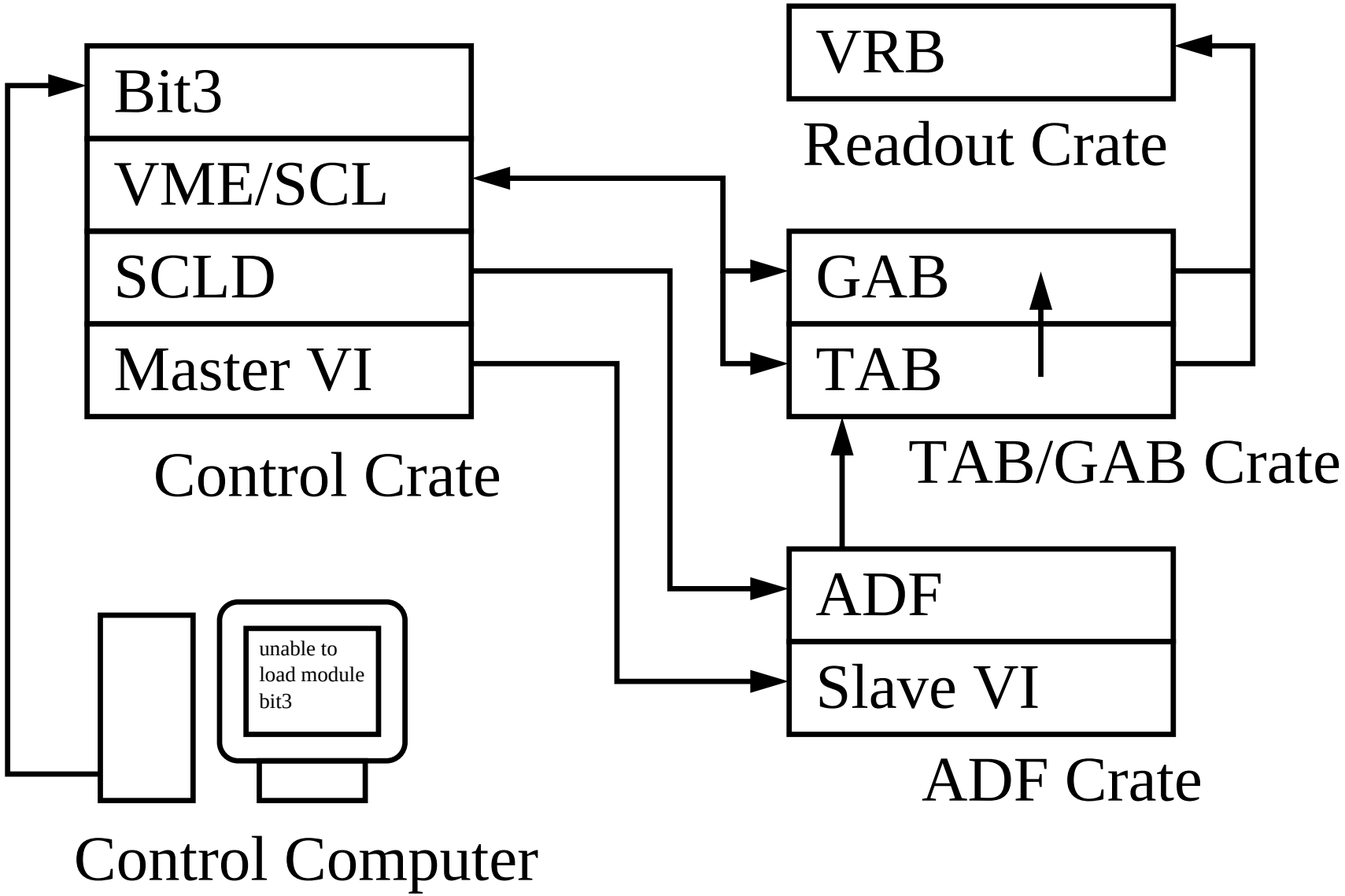
What hardware is needed?

- 1 ADF crate/ps: 1 VI slave, 1+ ADF card.
- 1 TAB crate/ps: 1+ TAB card, 1 GAB card.
- Communication crate/ps: Bit3 card, VME/SCL card, SCLD, 1 VI master.
- TAB-to-GAB cables
- VME/SCL-to-TAB/GAB
- SCLD-to-ADF cabling.

What software is needed?

- ADF firmware and driver
  - generate pseudo-random bit patterns
- TAB firmware and driver
  - receive and verify patterns at full speed
- GAB firmware and driver

Period 2



Crucial Milestone: Data to/from External Systems!

What can be tested?

- TAB/GAB→Tape (L3 interface)
- BLS Data→ADF (BLS-to-ADF transition system)
- GAB→Trigger Framework
- TAB→L1Muon (Cal-Trk)
- TAB/GAB→L2 (test crate?)

What additional hardware is needed?

- readout crate: VRB
- BLS-to-ADF transition system
- TAB/GAB-to-VRB optical cable
- optical splitter / TAB/GAB-to-L2 cabling
- GAB-to-framework cabling
- Install all 4 SACLAY splitters

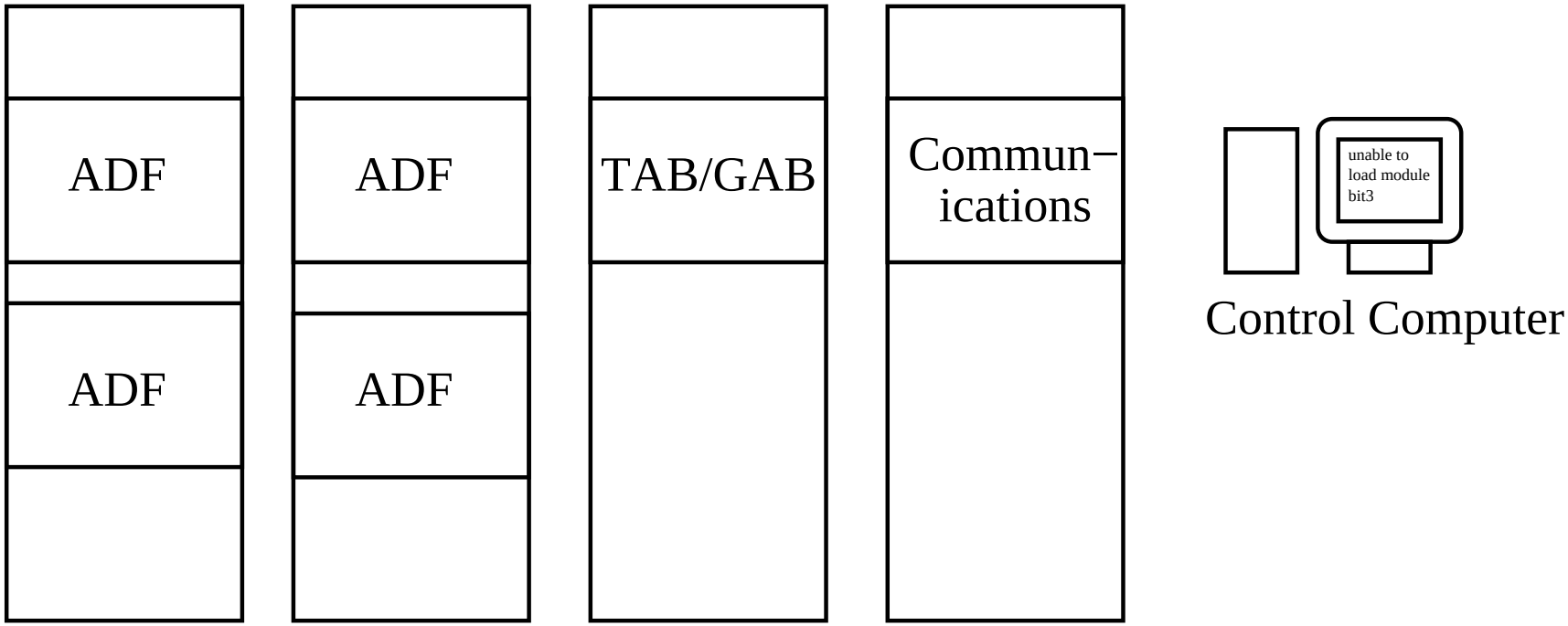
Online Software

- Unified L1Cal Control Environment:
  - merge separate ADF and TAB/GAB control code and GUIs
- Online Data Collection
  - collect oversampled data from ADF (digital filter tests)
  - streamline code for collecting readback memory data from TAB/GAB
  - scheme to sync online and offline data

Offline Software

- Fermilab
  - write/use data unpacker
  - compare splitter TT data with simulation, tune
  - monitoring software
  - calibration software
  - start creating efficiency and turn-on software
  - work on creation of Run IIb trigger list
- Nevis
  - continue compare simulation with TAB hardware
    - cannot with BLS: don’t know what it is!

Period 3



Crucial Milestone: Scalability and Stability!

What hardware is needed?

- Safety Review: power/cooling monitoring
- epics monitoring
- Final BLS-to-ADF transition system
- 4 ADF crates/ps: 4 VI slaves, ADF cards.
- 1 TAB/GAB crate: 8 TAB cards, 1 GAB.
- 1 comm crate: Bit3, VME/SCL, SCLD, 2 master VI.
- Readout Crate: VI SLAVE, VRBs
- Control Computer

What can be tested?

- low-level problems worked out: big picture.
- scalability and coverage
- long-term stability: continuous running.
- calibrations

What online software is needed?

- official control software (ADF, TAB, GAB):
  - configure FPGAs, initialization
  - COOR-TCC (???)
  - trigger DB implementation
- implement/test Run IIb Trigger List
- expert software (ADF, TAB, GAB):
  - patterns/fake data - tape
  - run low-level tests

What offline software is needed?

- test unpacker for stability
- analysis software (what is needed?)
- calibration:
  - understand current system
  - degree of accuracy required for splitter comparisons
  - spy calibration: use splitter data from pulser runs
- simulate rates
- study efficiencies